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10 30
atgaaaaagctgataaccgcagacgacatcacagcgattgtctctgtg
M K K L I T A D D I T A I V S V

50 70 90
accgatcctcaatacgcgccagacggtacccgtgccgcatatgtaaaa
T D P Q Y A P D G T R A A Y V K

110 130
tcacaagtaaatacaagagaaagattcgtatacatcaaataatatggatc
S Q V N Q E K D S Y T S N I W I

150 170 190
tatgaaacgaaaacgggaggatctgttccttggacacatggagaaaag
Y E T K T G G S V P W T H G E K

210 230
cgaagcaccgacccaagatgggtctccggacgggacgacgcttgccctt
R S T D P R W S P D G R T L A F

250 270 2
atttctgatcgagaaggcgatgcggcacagctttatatcatgagcact
I S D R E G D A A Q L Y I M S T

90 310 330
gaaggcgggagaagcaagaaaactgactgatatcccatatggcgtgtca
E G G E A R K L T D I P Y G V S

350 370
aagccgctatgggtccccggacggtgaatcgattctggtcactatcagt
K P L W S P D G E S I L V T I S

390 410 430
ttgggagagggggaaagcattgatgaccgagaaaaaacagagcaggac
L G E G E S I D D R E K T E Q D

450 470
agctatgaacctgttgaagtgcaggcctctcctacaaacgggacggc
S Y E P V E V Q G L S Y K R D G

490 510 5
aaagggtgacgagaggtgcgtatgccagcttgtgcttgtcagcgta
K G L T R G A Y A Q L V L V S V

30 550 570
aagtcgggtgagatgaaagagctgacaagtcacaaagctgatcatggg
K S G E M K E L T S H K A D H G

FIG._1A-1

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590 610
gatcctgctttttctcctgacggcaaattggcttggttttctcagctaatt
D P A F S P D G K W L V F S A N
630 650 670
ttaactgaaacagatgatgccagcaagccgcatgatgtttacataatg
L T E T D D A S K P H D V Y I M

FIG._1A-2

690 710
tcactggagtcctggagatcttaagcagggttacacctcatcgcggtca
S L E S G D L K Q V T P H R G S
730 750 7
ttcggatcaagctcattttcaccagacggaagggtatcttgctttgctt
F G S S S F S P D G R Y L A L L
70 790 810
ggaaatgaaaaggaatataagaatgctacgctctcaaaggcgtggctc
G N E K E Y K N A T L S K A W L
830 850
tatgatatcgaacaaggccgcctcacatgtcttactgagatgctggac
Y D I E Q G R L T C L T E M L D
870 890 910
gttcatttagcggtatgcgctgattggagattcattgatcggtgggtgct
V H L A D A L I G D S L I G G A
930 950
gaacagcgccccgatttggacaaaggacagccaagggttttatgtcatc
E Q R P I W T K D S Q G F Y V I
970 990 10
ggcacagatcaaggcagtacgggcatctattatatttcgattgaaggc
G T D Q G S T G I Y Y I S I E G
10 1030 1050
cttgtgtatccgattcgtctggaaaaagagtacatcaatagcttttct
L V Y P I R L E K E Y I N S F S
1070 1090
ctttcacctgatgaacagcactttattgccagtggtgacaaagccggac
L S P D E Q H F I A S V T K P D

FIG._1B-1

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1110 1130 1150
agaccgagtgagctttacagtatcccgcttggacaggaagagaaacag
R P S E L Y S I P L G Q E E K Q

1170 1190
ctgactggcgcggaatgacaagtttgtcagggagcatacgaatatcaata
L T G A N D K F V R E H T I S I

1210 1230 12
cctgaagagattcaatatgctacagaagacggcggtgatgggtgaacggc
P E E I Q Y A T E D G V M V N G

50 1270 1290
tggctgatgaggcctgcacaaatggaaggtgagacaacatatccactt
W L M R P A Q M E G E T T Y P L

1310 1330
attcttaacatacacggcggtccgcatatgatgtacggacatacatat
I L N I H G G P H M M Y G H T Y

1350 1370 1390
tttcatgagtttcagggtgctggcgggcgaaaggatacgcgggtcgtttat
F H E F Q V L A A K G Y A V V Y

FIG._1B-2

1410 1430
atcaatccgagaggaagccacggctacgggcaggaatttgtgaatgcg
I N P R G S H G Y G Q E F V N A

1450 1470 14
gtcagaggagattatgggggaaaggattatgacgatgtgatgcaggct
V R G D Y G G K D Y D D V M Q A

90 1510 1530
gtggatgaggctatcaaacgagatccgcatattgatcctaagcggctc
V D E A I K R D P H I D P K R L

1550 1570
gggtgtcacgggcggaagctacggagggttttatgaccaactggatcgtc
G V T G G S Y G G F M T N W I V

1590 1610 1630
gggcagacgaaccgcttttaaagctgccgttaccagcgctcgatatca
G Q T N R F K A A V T Q R S I S

FIG._1C-1

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1650 1670
aattggatcagctttcacggcgctcagtgatatcggctatttctttaca
N W I S F H G V S D I G Y F F T

1690 1710 17
gactggcagcttgagcatgacatgtttgaggacacagaaaagctctgg
D W Q L E H D M F E D T E K L W

30 1750 1770
gaccggtctccttttaaatacgcagcaaacgtggagacaccgcttttg
D R S P L K Y . A A N V E T P L L

1790 1810
atactgcatggcgagcgggatgaccgatgcccgatcgagcagggcggag
I L H G E R D D R C P I E Q A E

1830 1850 1870
cagctgtttatcgctctgaaaaaatgggcaaggaaaccaagcttgctc
Q L F I A L K K M G K E T K L V

1890 1910
cgttttccgaatgcatcgcacaaatttatcacgcaccggacaccaaga
R F P N A S H N L S R T G H P R

1930 1950 19
cagcggatcaagcgcctgaattatatcagctcatggtttgatcaacat
Q R I K R L N Y I S S W F D Q H

70
ctc
L

FIG._1C-2

dap2_yeast
 170 180 190 200 210 220
 WRHSTFGSYFVYDKSSSFEEIGNEVALAIWSPNSNDIAVYQDN-NIYYISAISKKTIRA
 ::|::: |||::: '| | |::: | | |::: |
 YUYXL MKKLITADDITAIVSVTPQYAPDGTGRAAYVKSQVNQEKDSYTSNIWIYE
 10 20 30 40 50

dap2_yeast
VTNDGSSFLNGKPDWVYEEEFEDDKAAWSP TGDYLAFLKID ESEVGEFIIPYVQDE
: : || | |:: | : | : | | | | |::: |::: |:: |
TKTGGSV-----P-WTHGEKRSTDPR---WSPDGRTLAFISDREGDAAQL---YIMSTE
230 240 250 260 270 280
60 70 80 90

KDIYPEMRSIKYPKSG--TPNPHAE LWVYSMKDGT SFHPRISGNKKDG--SLLITEVTW
 GGEARKLTDPYGVSKPLWSPDGESILVTISLGGESIDDR-EKTEQDSYEPVEVQGLSY
 290 300 310 320 330
 100 110 120 130 140 150

340 350 360 370 380 390
 VGNGNVLVKTTDRSSDILTVFLIDTIAKTSNVVRNE-----SSNGGWEITHNTLFIIPANE
 :|: |: : : ::| : ||: : : | :| :| :| : : :
 KRDGKGLTRGAYAQVLVSVKSGEMKELTSHKADHGDPAFSPDGKWLVSAN---LTETD
 160 170 180 190 200 210

TFDPRPHNGYVDILPIGGYN----HLAYFENSNS--HYKTLTEGKWEVVGPLA----F
 :||: |: | | : | : |: | : |: | : |: | : |: | :
 DASKPHDVYIMSL ESGDLKQVTPHRGSFGSSSPDGRYALLGNEKEYKNATLSKAWLY
 220 230 240 250 260 270

	450	460	470	480	490	499
adp2_yeast	DSMENRLYFISTRKSS	TERHYYID-LRSPNEI	IEVTD	TSEDGVYDV	SFSSGRRFGL--	L
	: : :	:	:	:	: : :	:
YUXL	DIEQRLTCLTEMLD	VHLADALIGD	SLIGAEQRP	ITKDSQGFY	IGTDQG	ST-GIYYI
	280	290	300	310	320	330

FIG. 2A

dap2_yeast
TYGPKVPYQKIVDFHSRKA EKCDGNVLGKS LYHLEKNEVLT KILEDYAVPR-KSFREL
: : | | : : : : | : : : : : : : : : :
SIEGLVPIRLEKEYINSFSLSPDEQHFIASVTKPDRPSEL-----YSIPLGQE EKQL

```

560      dap2_yeast      NLGDEFGKD-----ILVNSYEILPNDFEETLSDHYPVFFFAYGGPSNQ
      : : | : | : : : | : : : | : : : | : : : | : : :
      TGANDKFVREHTISIP EEIQYATEDGVMVNGWLMRPAQMEGETT--YPLILNIHGGPH-M
      390      400      410      420      430      440

```

dap2_yeast

	610	620	630	640	650	660
	QVVKTF	SVGFENE	VVASQL	NAIVVV	VDGRGT	GKFGQD
	SLVRD	RLGDY	EARDQ	ISAAS	-L	
	:	:	:	:	:	:
	:	:	:	:	:	:
	MYGHTY	FHEF-Q	VLA	AKGYA	-V	YI
	NP	RG	SH	GYGQ	EF	VNA
	VR	GDY	GK	DYDD	V	M
	Q	A	V	D	E	A

YUUXL

adap2_yeast
YUXXL

	670	680	690	700	710	720
YGS	LTFVDPQKISLF	GWSYGGLTLK	TLEKDGRHFKY	GMSVAPVDWRF	FYDSVYYTERYM	
	: :::	::	:	: ::	:::	: :
IKRDPHIDPKRLGVTGSGYGGFMTNWI	VQG	TN--R	FKA	AVTQRSIS	NWISEFHGVSDIGYF	
	510	520	530	540	550	

adap2_yeast

HTP-QENFDGYVES-SVHNVTALQAQR-----FLLMHGTGDDNVHFQNSLKFLDLLDLNG

YUYXL

FTDWQLEHDMFFEDTEKLWDRSPKYYAANVETPLLILHGERDDRCPIEQAEQLFIALKKMG

560 570 580 590 600 610

780 790 800 810
 V
 VAD2_YEAST VENYDVHVFPDSHSIRYHNANVIVFDKLLDWAKRAFDGQFVK
 YU1 | : | | : : | : :
 YU2 KETKLVR-FPNASHNLSRTGHPRQRIKRLNYISSWFDQHL
 620 630 640 650

FIG. 2B

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380	390	400	410	420	430	439
yux1.bsuep	QEEKLTGANDK	FVREHTIS	IPEEIQYATED	GMVNGWLMRPAQ	MEGETTYPLILNIHGG	
YTMA	MIVEKRRFPSPSQHVRLYTICYSNGLRVKGLLAEPAE-PGQ--YDGFLLYLRGG					
	10	20	30	40	50	
440	450	460	470	480	490	
yux1.bsuep	PHMMYGHTYFHEFQVLA	AKGYAVVYINPRGSHG-	YGQEFFVNAV	RGDYGGKDYDDVMQAVD		
YTMA	IKSV-GMVRPGRIIQFASQGFVVFAPFYRGNQGGEGNE-----DFAGEDREDAFSAF-					
	60	70	80	90	100	
500	510	520	530	540	550	
yux1.bsuep	EAIKRDPHIDPKRLGVT	GGSYGGFMTNWI	VGQTNRFKAAV	TQRSISNWI	SFHGVSDIGYF	
YTMA	RLQQHPNVKKDRIHIFGFSRGGIM-----GMLTAIEMGGQAAAFVSW---GGVSDMILT					
	110	120	130	140	150	
560	570	580	590	600		
yux1.bsuep	FTDWQLEHDMFEDT-----	EKLWDRSPLKYAAN	VETPPLLILHGERDD	RCPIEQAE		
YTMA	YEERQDLRRMMKRVIGGTPKKVPEEYQW-RTPFDQVNKIAPVLLIHGEKDQNVSIQHSY					
	160	170	180	190	200	210
					↑	Asp
610	620	630	640	650		
yux1.bsuep	QLFIALKKMGKETKLVR	FPNASHNLSRTGH	PRQRIKRLNYISS	WFDQHL		
YTMA	LLEEKQLKHPVETWYYSTFTHYFP-----PKENRRIVRQLTQWMKNR					
	220	230	240	250		
		↑	His			

FIG.-3

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yuxl.bsupep 410 420 430 440 450 460
PEEIQYATEDGVMVNGWLMRPAQMEGETTYPLILNIHGGPHMYGHTYFFHEFQVLAAGY
YITV 10 20 30 40 50
MIQIENQTVSGIPFLHIVKEENRHRRAVPLVIFIHGFTSAKE-HN-LHIAAYLLAEKGF

yuxl.bsupep 470 480 490 500 510
AVVYINPRGSHGYGQEFVNAVVRGDYGGKDYDDVMQAVDEA-----IKRDPHIDPKRLGV
YITV 60 70 80 90 100 110
RAVL--PEALH-HGERGEEMAVEELAGHFWDIVLNEIEEIGVLKNHFEKEGLIDGGRIGL

yuxl.bsupep 520 530 540 550 560 570
TGGSYGGFMTNWIVGQTNRFKAAVTORSISNWISFHVSDIGYFFTDWQLEHDMFED-TE
YITV 120 130 140 150 160 170
AGTSMGGITTLGALTAYDWIKAGVSLMGSPNYVELFQ-QQIDHI-QSQGIEIDVPPEEKVQ
Ser↑

yuxl.bsupep 580 590 600 610 620
KLWDRSPLKYAANV-----ETPLILHGERDDRCPIEQAEQLFIALKMGKET-----KLV
YITV 180 190 200 210 220 230
QLMKRLELRDLSLOPEKLOQRPLLFWHGAKDKVVPYAPTRKFYDTIKSHYSEQPERLQFI
Asp↑

yuxl.bsupep 630 640 650
RFPNASHNLSRTGHPQRQRIKRLNYISSWFDQHL
YITV 180 190 200 210 220 230
GLENADHKV-----PRAAV--LKTIE-WFETYL
His↑

FIG. 4

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yuxl.bsupep 390 400 410 420 430 440
TGANDKFVREHTISIP EIQYATEDGMVNVGLMRPAQMEGETTYPLILNIHGGP-HMMY
YQKD I I K R E T D N G H D V F E S F E Q M E K T A F V I P S A Y G Y D I K G Y H V A P H D T P N T I I I C H G V T M N V L N
40 50 60 70 80 90
yuxl.bsupep 450 460 470 480 490 500
GHTYFHEFQVLA A K G Y A V V Y I N P R G S H G Y G Q E F V N A V R G D Y G G K D Y D D V M Q A V D E A I K R D
YQKD S L K Y M H L F L D L - - - G W N V L I Y D H R - R H G Q S - - - - G G K T S Y G F Y E K D D D L N K V V S L L K N K T
100 110 120 130 140
yuxl.bsupep 510 520 530 540 550 559
P H I D P K R L G V T G S Y G G F M T N W I V G Q - - - - - T N R F K A A V T Q R S I S N W I S F H G V S D I G Y F F
YQKD N H R G - - L I G I H G E S M G A V T A L L Y A G A H C S D G A D F Y I A D C P F A C F D E Q L A Y R L R A E - - Y R L
150 160 170 180 190 200
yuxl.bsupep 560 570 580 590 600 610
T D W Q L E H - - D M F E D T E - - - - K L W D R S P L K Y A A N V E T P L L I L H G E R D D R C P I E Q A E Q L F I A L
YQKD P S W P L L P I A D F F L K R G G Y R A R E V S P L A V I D K I E K P V L F I H S K D D D Y I P V S S T E R L Y - - E
210 220 230 240 250 260
yuxl.bsupep 620 630 640 650
K K M G K E T K L V R F P N A S H N L S R T G H P R Q R I K R L N Y I S S W F D Q H L
YQKD K K R G P K A L Y I A - E N G E H A M S Y T K N R H T Y R K T V Q E F L D N M N D S T E
270 280 290 300
↑His
↑Asp

FIG.-5

FIG. 6

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10 30
ttgattgtagagaaaagaagatttccgctcgccaagccagcatgtgcgt
L I V E K R R F P S P S Q H V R

50 70 90
ttgtatacgatctgctatctgtcaaatggattacgggttaaggggctt
L Y T I C Y L S N G L R V K G L

110 130
ctggctgagccggcggaaccgggacaatatgacggattttttatatttg
L A E P A E P G Q Y D G F L Y L

150 170 190
cgcggcgggattaaaagcgtgggcatgggttcggccgggcccggattatc
R G G I K S V G M V R P G R I I

210 230
cagtttgcaccccaagggtttgtggtgtttgctcctttttacagaggc
Q F A S Q G F V V F A P F Y R G

250 270 2
aatcaaggaggagaaggcaatgaggattttgcccggagaagacagggag
N Q G G E G N E D F A G E D R E

90 310 330
gatgcattttctgcttttcgcctgcttcagcagcacccaaatgtcaag
D A F S A F R L L Q Q H P N V K

350 370
aaggatagaatccatatcttcggtttttcccgcggcggaattatggga
K D R I H I F G F S R G G I M G

390 410 430
atgctcactgcgatcgaaatgggcgggcaggcagcttcatttgtttcc
M L T A I E M G G Q A A S F V S

450 470
tggggaggcgctcagtgatatgattcttacatacgaggagcggcaggat
W G G V S D M I L T Y E E R Q D

490 510 5
ttgcggcgaatgatgaaaagagtcacgcggcggaacaccgaaaaaggtg
L R R M M K R V I G G T P K K V

30 550 570
cctgaggaatatcaatggaggacaccgtttgaccaagtaaaaaatt
P E E Y Q W R T P F D Q V N K I

FIG. 7A

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590 610
caggctcccgtgctgttaatccatggagaaaaagacccaaaatgtttcg
Q A P V L L I H G E K D Q N V S

630 650 670
attcagcattcctattttattagaagagaagctaaaacaactgcataag
I Q H S Y L L E E K L K Q L H K

690 710
ccggtggaaacatggtactacagtacattcacacattattttcccgcca
P V E T W Y Y S T F T H Y F P P

730 750 7
aaagaaaaccggcgtatcgtgcggcagctcacacaatggatgaaaaac
K E N R R I V R Q L T Q W M K N

70
cgc
R

FIG._7B

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10 30
gtgatacaaaattgagaatcaaaccgtttccggtattccggtttttacat
V I Q I E N Q T V S G I P F L H

50 70 90
attgtaaaggaagagaacaggcaccgcgctgttcctctcgtgatcttt
I V K E E N R H R A V P L V I F

110 130
atacatgggtttttacaagcgcggaaggaacacaaccttcatattgcttat
I H G F T S A K E H N L H I A Y

150 170 190
ctgcttgccggagaagggttttagagccgttctgcccggaggctttgcac
L L A E K G F R A V L P E A L H

210 230
catggggaacgggggagaagaaatggctgttgaagagctggcggggcat
H G E R G E E M A V E E L A G H

250 270 2
ttttgggatatcgtcctcaacgagattgaagagatcggcgtacttaaa
F W D I V L N E I E E I G V L K

90 310 330
aaccatttttgaaaaagagggcctgatagacggcggccgcgcgtctc
N H F E K E G L I D G G R I G L

350 370
gcaggcacgtcaatgggcggcatcacaacgcttggcgctttgactgca
A G T S M G G I T T L G A L T A

390 410 430
tatgattggataaaaagccggcgtcagcctgatgggaagcccgaattac
Y D W I K A G V S L M G S P N Y

450 470
gtggagctgttttcagcagcagattgaccatattcaatctcagggcatt
V E L F Q Q Q I D H I Q S Q G I

490 510 5
gaaatcgatgtgccggaagagaaggtacagcagctgatgaaacgtctc
E I D V P E E K V Q Q L M K R L

30 550 570
gagttgcgggatctcagccttcagccggagaaactgcaacagcgcccg
E L R D L S L Q P E K L Q Q R P

FIG. 8A

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590 610
cttttattttggcacggcgcaaaagataaagttgtgccttacgcgccg
L L F W H G A K D K V V P Y A P

630 650 670
acccggaaattttatgacacgattaaatcccattacagcgagcagccg
T R K F Y D T I K S H Y S E Q P

690 710
gaacgcctgcaatttatcggagatgaaaacgctgaccataaagtcccg
E R L Q F I G D E N A D H K V P

730 750
cgggcagctgtgttaaaaaacgattgaatgggttgaaacgtactta
R A A V L K T I E W F E T Y L

FIG._8B

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10 30
ttgaagaaaatccttttggccattggcgcgctcgtaacagctgtcatc
L K K I L L A I G A L V T A V I

50 70 90
gcaatcggaattgtttttcacatatgattctattcatcaagaaaaa
A I G I V F S H M I L F I K K K

110 130
acggatgaagacattatcaaaagagagacagacaacggacatgatgtg
T D E D I I K R E T D N G H D V

150 170 190
tttgaatcatttgaacaaatggagaaaaccgcttttgtgataccctcc
F E S F E Q M E K T A F V I P S

210 230
gcttacgggtacgacataaaaaggataccatgtcgcaccgcatgacaca
A Y G Y D I K G Y H V A P H D T

250 270 2
ccaaataccatcatcatctgccacgggtgacgatgaatgtactgaat
P N T I I I C H G V T M N V L N

90 310 330
tctcttaagtatatgcattttatttctagatctcggctggaatgtgctc
S L K Y M H L F L D L G W N V L

350 370
atztatgaccatcgccggcatggccaaagcggcggaaagacgaccagc
I Y D H R R H G Q S G G K T T S

390 410 430
tacgggttttacgaaaaggatgatctcaataagggttgtcagcttgctc
Y G F Y E K D D L N K V V S L L

450 470
aaaaacaaaacaaatcatcgcggttgatcggaattcatggtgagtcg
K N K T N H R G L I G I H G E S

490 510 5
atggggggccgtgaccgccctgctttatgctggtgcacactgcagcgat
M G A V T A L L Y A G A H C S D

30 550 570
ggcgctgatttttatattgcccattgtccgttcgcatgttttgatgaa
G A D F Y I A D C P F A C F D E

FIG._9A

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590 610
cagcttgcctatcggctgagagcggaatacaggctcccgtcttgcccc
Q L A Y R L R A E Y R L P S W P

630 650 670
ctgcttcctatcgccgacttctttttgaagctgaggggaggctatcgc
L L P I A D F F L K L R G G Y R

690 710
gcacgtgaagtatctccgcttgctgtcattgataaaattgaaaagccg
A R E V S P L A V I D K I E K P

730 750 7
gtcctctttattcacagtaaggatgatgactacattcctgtttcttca
V L F I H S K D D D Y I P V S S

70 790 810
accgagcggctttatgaaaagaaacgcggtccgaaagcgtgtacatt
T E R L Y E K K R G P K A L Y I

830 850
gccgagaacggtgaacacgccatgtcatataccaaaaatcggcatacgc
A E N G E H A M S Y T K N R H T

870 890 910
taccgaaaaacagtgcaggagtttttagacaacatgaatgattcaaca
Y R K T V Q E F L D N M N D S T

gaa
E

FIG._9B